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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,360	02/06/2002	Lawrence E. Bowman	B-1463	4283

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EXAMINER	
BARRECA, NICOLE M	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 09/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/072,360	BOWMAN ET AL.	
	Examiner	Art Unit	
	Nicole M. Barreca	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,6*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-29 in Paper No. 6 is acknowledged. The traversal is on the ground(s) that other methods of making the microstructures are incapable of forming overhang structures and closed structures. This is not found persuasive because, claim 29, directed to the product, does not include any product limitations and does not require that the microstructure include overhang or closed structures. Claim 29 is written in product-by-process form and therefore may by made by any method.

The requirement is still deemed proper and is therefore made FINAL.

2. Claim 29 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 6.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 4, 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. It is unclear what layer is meant to be the third layer in claim 4. Claim 2 (the claim on which claim 4 depends) has only a first photoresist, a sacrificial layer and a second photoresist. For examination purposes the examiner has interpreted the third layer to be a third layer of photosensitive material.

6. Claims 11, 12 and 14 contain the trademark/trade names AZ5200, ZEP7000, 495PMMA, 950PMMA, 1A37HV, 1C61. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a polymer or photoresist and, accordingly, the identification/description is indefinite.

7. Claims 11-15 as written depend on claim 4. However it appears that these claims were intended to depend on claim 5, since they further limit the types of photosensitive material listed in claim 5.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 2-4, 20-23, 27 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Conlon (US 5,035,939).

Conlon discloses a method for manufacturing a printed circuit board. A first layer of photoresist 14 is deposited on substrate 12 and patterned in a conventional manner to form a pattern. Dielectric ink layer 16 is deposited over the patterned photoresist and dried. A second photoresist layer 18 is then applied over layer 16. Dielectric layer 16 is removed from the opening during the development to the second photoresist layer. The remaining photoresist 14 is removed and the dielectric layer 16 is sintered, after which the via holes are filled with a conductive material. One or more barrier (sacrificial) layers may be used throughout the process. A suitable barrier layer is a polyalkylene carbonate, which may be rinsed away with acetone and burns cleanly in nitrogen or an oxygen containing gas. A barrier layer can be applied over the dielectric layer prior to applying the photoresist layer 18. A barrier layer is also applied to the substrate prior to the application of the first photoresist layer 14 (cl.27,28). One or more layers of barrier resin 24 may be deposited over the patterned dielectric layer 16 and copper layer 22. One or more barrier resin 27 may be spin coated over the entire surface prior to the deposition and pattering of photoresist layer 28 (additional, third photoresist). The excess portions of the via filled ink layer 26 is removed along with the excess portions of the barrier layers 24, 27 by spraying with acetone. See col.2, 44-col.4,21 and figures 1-6.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 5-15 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conlon as applied to claim 2 above, and further in view of Finter (US 6,001,428).

12. The teachings of Conlon have been discussed previously. Conlon is silent on the specific photosensitive composition used and does not disclose the limitations of claims 5-15 and 26. Finter teaches an epoxy resin composition crosslinkable with UV rays, which may be used as a photoresist composition (col.6, 18-22). This epoxy resin composition requires a shorter cure time, greater photosensitivity and improved mechanical properties when compared to the prior art epoxies (col.1, 14-25). Preferred photo initiators (curing agent) include aromatic sulfonium salts such as triarylsulfonium hexafluoroantimonate. Example 1 teaches using this photo initiator with diglycidyl ether of bisphenol A (col.6, 35-47). The crosslinking reaction is effected by exposing the layer to radiation such as UV and electron beam (col.6, 3-11). Customary additives (functional material), such as dyes, pigments, flow control agents or fillers may also be added (col.5, 9-32). It would have been obvious to one of ordinary skill in the art to use the epoxy resin composition for the photosensitive material in the method of Conlon because Finter teaches that this composition requires a shorter cure time, greater photosensitivity and improved mechanical properties.

13. Claims 16, 17, 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conlon as applied to claim 2 above, and further in view of DeSimone (US 6,298,902).

14. Conlon does not disclose using a fluoropolymer for the sacrificial layer or that this layer is removed using carbon dioxide. DeSimone teaches a method for using CO2-soluble materials as transient coatings which avoids the potentially environmentally hazardous techniques used in the prior art (col.1, 49-52). A three dimensional cavity is formed in a corresponding structure by first providing a structure comprising CO2-insoluble material, wherein the structure has a three-dimensional object comprising the CO2-soluble material, positioned therein. The object is then contacted with a fluid comprising CO2 to dissolve the object in the fluid and leaving a cavity corresponding to the shape of the three-dimensional object. The fluid includes CO2 in a liquid, gaseous or supercritical phase. The fluid may also include other components, such as aqueous and organic co-solvents. An example of CO2-soluble materials include fluoropolymers, such as 1,1'-dihydro perfluorooctyl methacrylate (col.2, 17-col.3, 27). It would have been obvious to one of ordinary skill in the art to use a fluoropolymer for the sacrificial layer and to remove this layer using carbon dioxide in the method of Conlon because DeSimone teaches that dissolving a CO2-soluble material, such as a fluoropolymer, in CO2 fluid provides a method for removing transient coatings and forming three-dimensional cavities in structures without using environmentally hazardous techniques.

15. Claims 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conlon as applied to claim 2 above, and further in view of DeSimone and Jur (US 6,558,475).

16. The teachings of Conlon and DeSimone have been discussed above. DeSimone teaches dissolving the transient (sacrificial) material using CO2 fluid and a co-solvent

such as an aqueous or organic solvent. DeSimone however is silent on any specific examples of co-solvents. Jur teaches that suitable co-solvents for use with a cleaning medium of supercritical carbon dioxide include fluorocarbons, ethers and hydrocarbons (col.5, 31-60). It would have been obvious to one of ordinary skill in the art to use fluorocarbons, ethers or hydrocarbons as the co-solvent the method of Conlon in view of DeSimone because Jur teaches that these are preferred co-solvents for use with a cleaning CO2 medium.

17. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Conlon in view of Finter and DeSimone.

18. The teachings of Conlon, Finter and DeSimone have been discussed previously. Conlon is silent on the specific photosensitive composition used and does not disclose that the photosensitive material is an epoxy resin of bisphenol A glycidyl ether polymer with a photoacid generator of triarylsulfonium hexafluoroantimonate. Example 1 of Finter teaches using a photo initiator (photoacid generator) of triarylsulfonium hexafluoroantimonate with diglycidyl ether of bisphenol A. The crosslinking reaction is effected by exposing the layer to radiation such as UV. It would have been obvious to one of ordinary skill in the art to use an epoxy resin of bisphenol A glycidyl ether polymer with a photoacid generator of triarylsulfonium hexafluoroantimonate for the photosensitive material in the method of Conlon because Finter teaches that this composition requires a shorter cure time, greater photosensitivity and improved mechanical properties over prior photosensitive epoxy compositions. Conlon does not disclose using a fluoropolymer for the sacrificial layer or that this layer is removed using

carbon dioxide. DeSimone teaches a method for using CO2-soluble materials as transient coatings which avoids the potentially environmentally hazardous techniques used in the prior art (col.1, 49-52). A three dimensional cavity is formed in a corresponding structure by first providing a structure comprising CO2-insoluble material, wherein the structure has a three-dimensional object comprising the CO2-soluble material, positioned therein. The object is then contacted with a fluid comprising CO2 to dissolve the object in the fluid and leaving a cavity corresponding to the shape of the three-dimensional object. An example of CO2-soluble materials include fluoropolymers. It would have been obvious to one of ordinary skill in the art to use a fluoropolymer for the sacrificial layer and to remove this layer using carbon dioxide in the method of Conlon because DeSimone teaches that dissolving a CO2-soluble material, such as a fluoropolymer, in CO2 fluid provides a method for removing transient coatings and forming three-dimensional cavities in structure without using environmentally hazardous techniques.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 703-308-7968. The examiner can normally be reached on Monday-Thursday (8:00 am-6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Nicole Barreca
Patent Examiner
Art Unit 1756

9/6/03